

Kona Drone Service LLC

KDS Operations and Procedure Manual

All operations will be conducted in accordance with the DJI P4R and T16 user manuals

KDS will utilize the Phantom 4 RTK, D-RTK2 base station, and the DJI Agras T16 UAS to provide an Aircraft Aerial Operation to apply pesticides needed in the Kona coffee growing region of Hawaii. The T16 will be flown and utilized on the farms owned by the owner of KDS. Once a Part 137 certification is approved, the service will be made available to other coffee growers.

CONCEPT: The autonomous T16 spaying mission will be planned utilizing the Phantom 4 RTK (P4R) and D-RTK2 base station to photograph the farm and collect data. A microSD card in the P4R is used to store data. The data is transferred to a Laptop with DJI Terra software to construct the mission spray path for the T16. The mission is then saved to the microSD card where it is loaded into the Remote controller (RC), for the T16. (The T16 and P4R controllers are identical but have different firmware and are not interchangeable). The mission path is then uploaded to the T16 and the RC confirms that the flight is ready. The T16 will launch, spray and notify when the spray tank is empty. It records this breakpoint to begin spraying the next tank and will return to home automatically if RTH has been selected for the mission.

FARM VISIT:

1. Mission feasibility. Topography, farm borders, orchard planting arrangement, obstacles (trees, poles, electrical wires, structures)
2. Identify potential helipad sites. Check obstacle clearance.

3. Safety and Security discussion with farm owner.
4. The mission can then be preplanned and named at the office with the DJI MG app on the P4R remote controller.

P4R PHOTO FLIGHT CHECK LIST:

1. RC and P4R batteries fully charged
2. MicroSD card installed in P4R
3. RC and D-RTK2 batteries (WB37) installed. (These batteries are interchangeable).
4. Set up and align D-RTK2 base, turn on center button. Light will turn green when connected to satellites. Press and hold right button for mode 1. Green light flashing once.
5. REMOVE CAMERA GIMBLE from P4R. Inspect and install propellers on P4R. Install P4R battery.
6. Turn on RC. Turn on P4R. Check for linking
7. In DJI MG on controller go to: Open view. Turn on RTK, select D-RTK2 Mobile Station in service type.
8. Check for left green light on D-RTK2 Base, press if necessary.
9. Place the P4R on the helipad where it will take off.
10. On RC press invoke, Start, mission is uploaded to P4R, launch by sliding indicator.
11. Maintain VLOS with drone, follow on MG screen. Drone will return to home when mission complete.

DJI TERRA 2D reconstruction:

Mission photos of the farm are uploaded from the microSD card to a laptop with Terra software. The software creates a 2D image of the farm so that a flight path can be generated for the T16 spray mission. The mission is named and saved to the microSD card.

KDS T 16 preflight check list:

1. Batteries: Have adequate T16 batteries fully charged to complete mission. Have adequate RC batteries fully charged.
2. Locate the T16 on Helipad. Check for clearance safety.
3. Unfold six motor arms. Tighten assembly sleeves, make sure the alignment stripes are aligned. KDS has added white alignment stripes to sleeve nuts so that a visual inspection can immediately identify an unlock motor arm. (Failure to lock assembly sleeves is the single most prevalent cause of startup incidents).
4. Inspect blades, align and check motors for security.
5. Load T16 battery and securely lock.
6. Load spray tank
7. Set up and align D-RTK2 base, turn on center button. Light will turn green when connected to satellites. Press and hold right button for mode 1. Green light flashing once.
8. Turn on RC, Turn on T16, check for linking
9. Install microSD card in RC, select flight route and import to T16
10. Turn on RTK function
11. Insure linking with D-RTK base station
12. Invoke mission
13. Slide to launch

14. Maintain VLOS with drone, follow on MG screen. Drone will return to home when mission complete or empty spray tank.

KDS Post-flight after spray mission

1. Fill tank with soapy water and spray until empty. Repeat twice.
2. Detach spray tank and clean.
3. Clean aircraft body with moist soft cloth. Do not use excessive water
4. Remove and inspect battery.
5. Inspect rotor blades
6. Fold motor arms and store aircraft in dry environment.
7. Record flight time in flight log.

PESTICIDE MIXING PROCEDURES

KDS will use a 25- gallon Maruyama spray tank for mixing pesticide sprays. The tank has internal flow for circulation and provides a safer alternative than spray mixing in smaller tanks.

Pesticide mixing check list:

1. Spray mixing will be done in accordance with the pesticide label.
2. Use only liquid formulation pesticides.
3. Proper clothing for mixing includes long pants, long sleeve shirt, hat, rubber gloves and preferably rubber boots.
4. Fill the spray tank with clean water with the hose separated from the tank water to prevent any backflow.

5. Empty containers are rinsed three times, punctured and properly disposed.
6. Care should be taken to prevent any spillage.
7. Clean and flush the mixing equipment with water at least 2 times following use.
8. Kona Community Hospital is the closest pesticide treatment center.